

CLAIMS

WE CLAIM:

1 1. A process for treating an industrial waste stream containing a borane
2 compound comprising contacting the industrial waste stream with a resin carrying an
3 oxidation catalyst that is capable of oxidizing said borane compound to boric acid.

1 2. The process of claim 1 wherein said contacting includes mixing the industrial
2 waste stream with the resin.

1 3. The process of claim 2 wherein said contacting includes one of the following:
2 (i) simultaneously mixing the industrial waste stream with an organic solvent and the
3 resin, or (ii) mixing the industrial waste stream with an organic solvent to form a
4 solution, followed-by mixing the solution with the resin.

1 4. The process of claim 3 wherein the organic solvent is selected from the group
2 consisting of at least one ketone, at least one aldehyde, a mixture of at least one
3 ketone and at least one alcohol, a mixture of at least one aldehyde and at least one
4 alcohol, a mixture of at least one ketone, at least one aldehyde and at least one
5 alcohol, a mixture of at least one ketone, at least one alcohol and water, a mixture of
6 at least one aldehyde, at least one alcohol and water, and a mixture of at least one
7 ketone, at least one aldehyde, at least one alcohol and water.

1 5. The process of claim 4 wherein the at least one ketone is selected from the
2 group consisting of acetone, dihydroxyacetone, fructose, dextrose, sucrose and
3 mixtures thereof.

1 6. The process of claim 4, wherein the at least one aldehyde is selected from the
2 group consisting of formaldehyde, acetaldehyde, glyoxal, glyoxylic acid and mixtures
3 thereof.

1 7. The process of claim 4 wherein the at least one alcohol is selected from the
2 group consisting of methanol, ethanol, n-propanol, isopropanol, ethylene glycol,
3 propylene glycol, glycerol, and mixtures thereof.

1 8. The process of claim 4 wherein the organic solvent is a ketone.

1 9. The process of claim 8 wherein the ketone is acetone.

1 10. The process of claim 4 wherein the organic solvent is a mixture of a ketone
2 and an alcohol.

1 11. The process of claim 10 wherein the ketone is acetone and the alcohol is
2 isopropanol.

1 12. The process of claim 1 wherein the resin is a polymeric resin.

1 13. The process of claim 12 wherein the polymeric resin is a styrene-
2 divinylbenzene resin.

1 14. The process of claim 1 wherein the oxidation catalyst includes a sulfonic acid
2 group.

1 15. The process of claim 3 wherein the oxidation catalyst includes a sulfonic acid
2 group.

1 16. The process of claim 1 wherein said contacting includes mixing the industrial
2 waste stream with an organic solvent to form a solution containing the industrial
3 waste and passing the solution containing the industrial waste through a vessel
4 containing the resin.

1 17. The process of claim 12 wherein the organic solvent is selected from the group
2 consisting of at least one ketone, at least one aldehyde, a mixture of at least one
3 ketone and at least one alcohol, a mixture of at least one aldehyde and at least one

4 alcohol, a mixture of at least one ketone, at least one aldehyde and at least one
5 alcohol, a mixture of at least one ketone, at least one alcohol and water, a mixture of
6 at least one aldehyde, at least one alcohol and water, and a mixture of at least one
7 ketone, at least one aldehyde, at least one alcohol and water.

1 18. The process of claim 17 wherein the at least one ketone is selected from the
2 group consisting of acetone, dihydroxyacetone, fructose, dextrose, sucrose and
3 mixtures thereof.

1 19. The process of claim 17 wherein the aldehydes are selected from the group
2 consisting of formaldehyde, acetaldehyde, glyoxal, glyoxylic acid and mixtures
3 thereof.

1 20. The process of claim 17 wherein the at least one alcohol is selected from the
2 group consisting of methanol, ethanol, n-propanol, isopropanol, ethylene glycol,
3 propylene glycol, glycerol, and mixtures thereof.

1 21. The process of claim 17 wherein the organic solvent is a ketone.

1 22. The process of claim 21 wherein the ketone is acetone.

1 23. The process of claim 16 wherein the resin is a polymeric resin.

1 24. The process of claim 23 wherein the polymeric resin is a styrene-
2 divinylbenzene resin.

1 25. The process of claim 16 wherein the oxidation catalyst includes a sulfonic acid
2 group.

1 26. The process of claim 1 wherein the borane compound is dimethylamine
2 borane.

1 27. The process of claim 26 wherein the dimethylamine borane is oxidized to
2 boric acid.

1 28. The process of claim 1 wherein said contacting is carried out at ambient
2 temperature.

1 29. The process of claim 26 wherein said contacting is carried out for at least 2
2 minutes.